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Two strands of servitization: A thematic analysis of traditional and customer co-created servitization and future research directions

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ABSTRACT

The servitization literature has diverged, some adopting a goods-dominant logic and some a service-dominant logic. While both literature streams deal with servitization, their conceptual underpinnings and use of key terms are fundamentally different and have become confused within literature. This lack of clarity and understanding presents a challenge to both research and practice. The paper asks what the points of convergence and divergence are between the two streams of literature. The extant literature is reviewed to identify and understand where and how the streams converge and diverge. A two-tiered thematic analysis with both semantic and latent theme analysis is employed. Our findings highlight five points of departure, as well as highlighting examples where both logics have been applied. The five points of departure are the differing conceptualisations of: Value-in-Use, Design of the Servitized Offering, Value Co-production and Value Co-creation, Contextual Variety and Complexity, and Business Model of Solutions and Outcomes. We also propose conditions under which one logic may be more appropriate, in particular we find that adoption of a goods-dominant logic and service-dominant logic are better suited to the pursuit of efficiency and effectiveness, respectively. Finally, we identify future research directions, particularly within the domain of the Internet-of-Things.

1. Introduction

Over the last decade there has been increasing support to conceptually challenge our assumptions regarding value and exchange (Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2004). This re-evaluation has been brought to the fore in light of increasing globalisation, the rise of digital economies and the prominence of the service sector in Western industrialised nations (Prahalad and Ramaswamy, 2000). In ever-increasing competitive markets, manufacturing[1] organisations are seeking to create additional value, and thus improve their competitive advantage, through the provision of service (Baines et al., 2009a; Turunen and Neely, 2012). The rationale for this is to create new longitudinal revenue streams across the product lifecycle, improve profit margins and enable greater differentiation instead of competing on cost alone (Baines et al., 2009a; Gebauer et al., 2011; Bustinza et al., 2015).

This paper argues that servitization research inherently encompasses two themes, both of which focus on value away from exchange and towards usage. Indeed, servitization can be described as the process of tailoring value propositions to enable consumers' greater efficacy in achieving desired outcomes (Miller et al., 2002; Baines et al., 2009a). In doing so, there is an inherent move away from the traditional transactional exchange between the firm and customer, to a longitudinal relationship centred on hybrid product service offerings (Smith et al., 2014). Yet, the move towards greater service content brings new challenges, requiring the fundamental tenets of value creation to be revisited in order to inform research and practice as to how the reconceptualisation of value and exchange affects the design and enactment of servitized strategies (Bustinza et al., 2015).

The phenomenon of servitization has resulted in two parallel streams of literature. In the first, (Type 1) servitization is viewed as an extension of manufacturing research, a mindset associated with a goods-dominant (G-D) logic (Vargo and Lusch, 2004, 2008). Within this logic, service is considered to be an add-on to the physical product and as more attributes of service are added to achieve an uninterrupted performance of a physical asset, complexity increases (Tukker, 2004; Baines et al., 2009a). A second stream of literature (Type 2), which we term customer co-created servitization (CCoS), proposes shifting the mindset away from the manufacturing approach, towards a service-dominant (S-D) logic (Ng et al., 2009; Smith et al., 2014). Placing

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[1] Manufacturing is taken in the broad sense to represent any organisation with technology innovation capabilities at its core (Aston Business School, 2013).

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greater emphasis on the customer's context, S-D logic focuses on the co-created value attained by the customer when experiencing or using the physical product. This applied approach considers servitization as the process of designing a service system that incorporates both the firm and customer's resources (Spohrer and Maglio, 2008). With the focus on achieving customer outcomes, complexity is seen to stem from heterogeneity of use contexts, otherwise known as contextual variety (Batista et al., 2013). Ontologically, in a G-D logic, value resides atomistically within a physical product, created, determined and 'added-on' by the firm. In CCoS, value is phenomenologically derived in use, through the mutual integration of both firm and customer resources.

By means of a two-tiered thematic analysis, we clarify and disseminate the conceptual differences of the two approaches, examining the points of departure that stem from the underlying assumptions of value creation. A thematic analysis is deemed suitable as it allows for the identification of patterns within the literature (Fereday and Muir-Cochrane, 2006). Analysis of these emergent themes enables the meanings and implications to be deciphered in order to provide clarity for the phenomenon under investigation (Patton, 1990). Our findings suggest that the two approaches are conceptually distinct, but are not necessarily competing ideals. Rather, we argue that both conceptualisations have merit, but that under certain circumstances, one may be more appropriate than the other. In order for the servitization literature to progress unhindered, it is important to understand the conceptual differences between the two approaches to the phenomenon. If we continue to misinterpret the underlying principles of each approach, servitization research will suffer in terms of both quality and understanding.

We contribute to the literature in two ways. First, we add to the development of the servitization research by providing clarity on the convergent and divergent themes. At present, the literature exhibits different conceptualisations and interpretations of specific terms. However, these are rarely made explicit and have led to some confusion within the literature, potentially hindering its progression. By elucidating the differences between the two approaches, we enable future research to progress unhindered by confusion in the use and meaning of different terms. Furthermore, we present conditions under which either approach may be more appropriate for researchers and practitioners to adopt. Second, we contribute to the development of mid-range theory in S-D logic. Following the advice of Brodie et al. (2011), we use the findings of our thematic analysis to formulate propositions regarding the implications of applying S-D logic to servitization research, so that they can be empirically investigated in future research. Finally, we present avenues for future CCoS research, particularly within the domain of the Internet-of-Things (IoT).

2. Servitization research: a literature review

Servitization is now an established area of enquiry, with Baines et al. (2009a) defining it as "*the innovation of an organisation's capabilities and processes to better create mutual value through a shift from selling products to selling Product-Service Systems*" (pp. 555), where a product-service system is defined as "*an integrated product and service offering that delivers value in use*" (Baines et al., 2007 pp. 3). The premise of servitization lies in transitioning the firm from selling physical products to selling capabilities for achieving solutions (Aston Business School, 2013) and thus embodies the transition in thought from value-in-exchange to value-in-use. The product-service transformation of the firm, as servitization is commonly referred to, has often been described as an organisation's move from offering a pure product to a pure service value proposition (Oliva and Kallenburg, 2003; Tukker, 2004; Gebauer et al., 2005; Pawar et al., 2009). From this perspective, service activities are seen as intangible 'added value' to support the physical product offering's use throughout its lifecycle, allowing manufacturers to derive increased revenue (Vandermerwe and Rada, 1988; Davies, 2004).

Tukker (2004) classifies product-service system (PSS) business models as product-, use- and result-orientated. As the firm moves along this continuum towards greater service content, Pawar et al. (2009) state that layers of complexity are added to the physical product to ultimately provide solutions for the customer. This notion of added complexity is believed to stem from the organisation's challenges and cultural difficulties associated with the transition to service (Neely, 2008; Baines et al., 2009a; Martinez et al., 2010; Neely et al., 2011). Failure to address these challenges may contribute to what has become known as the service paradox (Gebauer et al., 2005) whereby investment in service design and delivery does not deliver the expected returns, impacting profitability and therefore threatening the viability of the firm (Neely, 2008).

The PSS classifications and challenges highlighted predominantly focus on developing the firms' capabilities as an extension of their manufacturing abilities. Whilst this acknowledges the increased importance placed on collaboration with the customer, recurrent terms such as 'providing solutions to' allude to the relegation of customers to a passive role. As servitization and its associated challenges gain prominence, some research, predominantly those coming into manufacturing from a marketing domain, has begun to focus on the visibility of the customer and their contextual use environment (Heinonen et al., 2010) as a different approach to mitigating the potential service paradox (Ng et al., 2008). The focus on customer use contexts was fuelled by novel business models in servitization such as 'power-by-the-hour' where payment for the servicing of equipment is based on use rather than repair. Research into these areas resulted in findings that highlight the need for customer capabilities and resources to be integral to the design of future offerings and the need to focus on a service system of multiple stakeholders that includes the customer (Ng et al., 2011a, 2011b; Jaakkola and Hakanen, 2013). Challenging the linearity of servitization, a set of literature emerged proposing that a firm must integrate its capabilities with that of the customer, to develop joint capabilities that enable the consistent co-creation of mutually-valuable outcomes that go beyond just the performance of physical assets (Guo and Ng, 2011; Polese et al., 2011; Smith et al., 2012; Barnett et al., 2013).

This stream of research found compatibility with Vargo and Lusch's (2004, 2008) S-D logic, which provides an alternate lens through which to conceptualise value creation, placing the co-creation of value-in-use at the fore. S-D logic proposes service as the application of skills and knowledge by one entity for the benefit of another and that it is service, rather than utility (the perceived usefulness of an offering, embedded at creation), that is the fundamental basis of exchange.

2.1. Service-dominant logic and customer co-created servitization

S-D logic has gained considerable attention in the academic domain. Despite this however, there exists criticism about its abstract nature, which has led to confusion and potential reluctance in its uptake among practitioners (O'Shaughnessy and O'Shaugnessy, 2009). Researchers have been encouraged to develop mid-range theories focused on the application of S-D logic in empirical settings (Brodie et al., 2011) that may help to bridge the gap between academia and industry. Brodie et al. (2011) go on to suggest that four of the 10 foundational premises (FP) of S-D logic are core to such theory development:

FP1: Service is the fundamental basis of exchange.
FP6: The customer is always a co-creator of value.
FP9: All economic and social actors are resource integrators.
FP10: Value is always uniquely and phenomenologically determined by the beneficiary.

In addition to the FPs listed above, FP3: Goods are a distribution mechanism for service provision (Vargo and Lusch, 2008) is of particular importance when considering the application of S-D logic to servitization. Put differently, a physical product offering can be viewed as an indirect service provision (Ng and Briscoe, 2012). Applied to a servitization context, these FPs propose that the totality of a firm's offering is service (the application of competencies). Thus the firm's servitized offering is one of applied competencies, where the physical product and direct service activities together constitute the firm's value proposition to support the achievement of customer outcomes (Guo and Ng, 2011). Particular emphasis is placed on value co-creation and resource integration, signifying the importance of the customer's competency and context of use in achieving desired outcomes. As a result, over the last decade researchers have utilised S-D logic to investigate a customer co-created approach to servitization, how best to improve the system of product use and experience through the concept of a service system (Barnett et al., 2013) and how to optimise the firm's value proposition within such a system.

2.2. Research objectives and questions

The above literature review serves to identify the segregation of servitization research into two streams. While both strands of literature have dealt extensively with servitization, it is a challenge to understand the divergences and overlaps with the two approaches, and this can potentially impede future research in this space. There is a clear gap in the literature for a comparative analysis of both streams to elucidate any confusion. This paper sets out to address this gap by clarifying the two approaches to servitization research in terms of their conceptual differences. Moreover, we seek to determine the conditions under which either approach may be more appropriate for researchers and practitioners to adopt, thereby providing the basis for future research avenues. In order to do so, we look to answer the following principal research questions:

RQ1. What are the points of convergence and divergence between the two approaches to servitization research?
RQ2. Under what conditions would the use of one approach be more appropriate than the other?

3. Methodology – thematic analysis

Our initial literature review highlighted the need for a comparative review of the extant literature to identify, analyse and disseminate the conceptual disparities of the two research streams. Thematic analysis was identified as an appropriate method to accomplish this, as its purpose is to search for emergent themes associated with the phenomenon in question (Daly et al., 1997). Thematic analysis offers a theoretically flexible approach to qualitative enquiry that aims to identify and describe patterns (Braun and Clarke, 2006). Moreover, it allows for the synthesis and translation of key concepts within qualitative literature; translation is taken as the process of recognising similar concepts in studies where they may be expressed using different words (Thomas and Harden, 2008).

A thematic analysis involves identifying themes via "*careful reading and re-reading of the data*" (Rice and Ezzy, 1999, p. 258), with Braun and Clarke (2006) describing a theme as that which "*captures something important about the data in relation to the research question, and represents some level of patterned response or meaning*" (p. 10). The aim is to synthesise patterns within a set of data, for the emergence of themes that become the ultimate category for analysis (Fereday and Muir-Cochrane, 2006). More specifically, Patton (1990) suggests that the analytical process of thematic analysis should attempt to theorise not only the significance of patterns but also their broader meanings and implications. Similarly, Braun and Clarke (2006) recommend that researchers should go beyond the surface (or semantic) level to incorporate latent themes in order "*to identify or examine the underlying ideas, assumptions, and conceptualisations … that are theorised as shaping or informing the semantic content of the data.*" (p. 13). Such latent analysis is particularly important to our research questions as we set out to determine and analyse what conceptual foundations form the basis for semantic divergences.

Hence, in order to first develop the themes relating to the disparity of approaches in servitization literature, and then examine in greater detail the conceptual positions from which these approaches stem, we employed a two-tiered thematic analysis procedure comprising both semantic and latent theme analysis. Semantic analysis was used to provide an idea of potential areas of divergence, the results of which are organised and presented in the Appendix. Latent theme analysis was then employed by incorporating supporting evidence throughout the body of text, discussing and contrasting the underlying ideas, assumptions and conceptualisation of the two streams, along with their implications on the different approaches. The findings are presented in a tiered basis, with each section serving to build upon concepts of the previous ones. In this way the reader is presented with a thorough understanding of the divergences present within the servitization literature.

3.1. Selection and analysis of literature

The methodological strategy developed to identify appropriate literature required the identification of key data sources and search terms. We used a broad selection of databases to ensure the inclusion of journal articles, conference proceedings, books, white papers and reports. These databases included Emerald, Taylor & Francis, Elsevier and Wiley, and whilst they are not exhaustive in terms of the extant servitization literature, they do contain the majority of sources with substantial contributions on the topic. In line with the suggestions of Jones et al. (2011), key servitization terms were extracted from the existing literature to enable objective search criteria, and from across a range of different disciplines to ensure our study included all the relevant literature.

A two-step analysis was employed to establish the relevance of the literature for the semantic analysis. First, we reviewed the titles and removed those not deemed relevant. Second, the abstracts of those considered appropriate from the first round of culling were read and discarded if not seen to be pertinent, to ensure relevance to the review. We chose not to restrict the criteria of relevant papers by date, to avoid limiting the conceptual basis of the themes. However, to ensure greater validity in the analysis of concurrent developments in the two streams, the review focused predominantly on post-2004 literature following the publication of S-D logic. After the key themes were identified, we then investigated supporting references from the key papers of the semantic analysis to identify and elaborate on the conceptual basis of their arguments. This ensured relevance between the semantic and latent levels of the thematic analysis.

4. Findings and points of convergence and divergence

We label the two streams of literature as Type 1 being traditional servitization and Type 2 being customer co-created servitization. The following section presents the five themes identified in our analysis of the extant literature, providing the conceptual divergence of Type 1 and Type 2 servitization research.

4.1. Theme one: value-in-use

Both Type 1 and Type 2 consider customer centricity as a key constituent of a servitized manufacturer (Oliva and Kallenberg, 2003; Baines et al., 2009a; Smith et al., 2012). In so doing, the term 'value-in-use' is often used to underpin customer centricity, and both Type 1 and

Type 2 refer to the achievement of value-in-use as the driver behind the implementation of servitized strategies. However, there seems to be disparity in the way the term is used, in particular where value is created.

Baines et al. (2009a) note that traditionally, "*the main part of total value creation was considered to stem from physical goods, and services were assumed purely as an add-on to products*" (p. 555). The authors go on to state that more recent research recognise services to be the "*main differentiator*", where the product is reduced to becoming just part of the offering. In this context however, direct service activities are referred to as value-added activities. This notion of 'value added' implies that Type 1 literature considers value as embedded utility (Ng and Smith, 2012); it is atomistically embedded in both the physical product and the service activities created by the firm for the customer's use. With value being created and delivered by the firm, this focuses the servitization strategy on the reliability of the firm's performance in *delivering* the value *created by* the firm to be *used by* the customer. The customer is therefore a passive 'receiver' of value in its use (Prahalad and Ramaswamy, 2004).

In Type 2 literature, the customer is integral to the value-creating process of use or experience with both the physical product and its corresponding service activities (Prahalad and Ramaswamy, 2000). This therefore leads to a crucial philosophical implication not made in Type 1 literature: if value is only created in use, then the customer must necessarily be the co-creator of value (Maglio et al., 2009). Manufacturers cannot then deliver value, but instead offer value propositions, acceptance of which allows value to be *created with* and *determined by* the customer (Vargo and Lusch, 2008). This changes the boundary between firm and customer into a collaborative relationship since the creation of value, essential for the firm's viability, extends beyond the proposition and into the contextual space of use, in which both parties are accountable for the achievement of desired outcomes (Smith et al., 2014; Frow et al., 2015).

Type 1 similarly recognises the move away from transaction-based toward longitudinal, relationship-based interaction. For example, by categorising five connecting factors of such buyer-supplier relationships: information exchange, operational linkages, legal bonds, cooperative norms and buyer-supplier adaption (Martinez et al., 2010; Bastl et al., 2012). However, these relational specific factors are seen as directly arising from the need to increase the firm's effectiveness in providing the integrated solutions. Under Type 1, since the firm creates value through manufacturing the physical product and its corresponding service, customer use is an important part of its viability, but the firm does not 'own' that contextual space, the way Type 2 approach expects. Type 1's unit of analysis is very much firm-centric on creating and delivering value with the customer seen as a use participant, while Type 2's unit of analysis is very much customer-centric on the context of use and experience with the firm seen as a value proposition participant.

4.2. Theme two: design of the servitized offering

Our findings show that the implication of Type 2's focus on co-creation in the context of use and experience, requires a fundamental change in how organisations design future offerings. Payne et al. (2007) describe this change as a move from an inside-out to an outside-in mentality to value propositions. Rather than basing future offerings on the current competencies of the organisation (inside-out), firms should first understand customer value-creating processes and aim to provide greater support for co-creation in these contexts (outside-in). This approach is similarly encouraged by Grönroos and Ravald (2011), who state that understanding a customers' value-creating processes allows the organisation to design more effective and efficient ways to provide resources that support value co-creation. Yet both streams view servitized manufacturers as striving to optimally configure resources (both human and material) to enable the most effective and efficient manner of delivering valuable solutions or supporting customers in co-creating their desired outcomes, respectively (Baines et al., 2009a; Smith et al., 2014), suggesting that both streams converge on this approach. However, closer examination reveals that the Type 1 conceptualisation of embedded utility implies that this approach cannot truly be viewed as outside-in, as the customer, while important, is exogenous to value creation.

In contrast, the Type 2 view considers the process of value co-creation as occurring through mutual resource integration (Vargo and Lusch, 2008). Hence, to understand customer value-creating processes to enable the most effective design of offerings, a manufacturer must consider the availability of existing customer resources and how best to complement them (Jaakkola and Hakanen, 2013). Indeed, Takeyama et al. (2014) stress the importance of recognising that any resource cannot exist in isolation but rather, they 'become' (De Gregori, 1987) when drawn upon to support other resources in customers' context of use. Ng et al. (2012b) explain this by stating that resources are only 'active' in the enabling processes of eventual outcomes, with resources seen as bundles of potential service, and activities the process through which they are realised to achieve value. In this way resource integration and by extension, value co-creation, is multidirectional, with all parties uniquely integrating multiple resources in relational value-creating systems (Ng et al., 2012b; Frow et al., 2015). Accordingly, Vargo (2008) suggests that the firm's offering should be seen as input for the customer's resource-integrating value-creation activities rather than as its own integration of customer resources for the production of valuable output. The conclusion of this course of thought is that Type 2 literature advocates the need for customer resource and context to feature in the design of future offerings.

The key difference between Type 1 and Type 2 literature is the role of the physical product. For Type 1 literature, the physical product is unchanged, with services seen as 'add-on' activities required to assist in customer usage (Vandermerwe and Rada, 1988; Verstrepen and van Den Berg, 1999; Baines et al., 2009a). This is made clear throughout the body of Type 1 servitization literature. For example, Lightfoot et al. (2013) find in their review of the literature that most studies focusing on the design elements of servitization emphasise organisational changes to accommodate the additional risk, with no mention of product changes. Even with technological advances such as sensor technologies generating vast amounts of data, the focus is on remote health and usage monitoring (Grubic, 2014) or on improving the efficiency of the firm's service offering (Zaki and Neely, 2014). For example, use data is employed to improve spare part decision making (Kim et al., 2007), whilst predictive analytics utilise equipment use data to prevent equipment failure and improve efficiency (Swanson, 2001). Finally, the use of 3D printing has been ranked by the Cambridge Service Alliance as a top-10 technology in a recent briefing paper (Dinges et al., 2015). However, they coupled it with predictive analytics to create spare parts just-in-time at the customer's site, utilising the technology for efficiency gains rather than to change the core physical product.

Type 2 literature does not consider the physical product as unchangeable, but instead acknowledges both its limitations and advantages as an indirect service. The advantage of physical products is that it creates standardisation so that the firm can replicate or scale better, resulting in lower costs and greater viability (Ng and Briscoe, 2012). Its limitation, however, is its inability to be flexible for the customer's context of use (elaborated in Theme 4). This approach therefore considers one of servitization's challenges as determining where rigidity and a stable boundary should be within a service system (the role of the physical product) and where variety is necessary for the customer's use (the role of service activities). Furthermore, Ng (2013) claims that service activities may be difficult to scale and replicate paradoxically because of the legacy physical product, since the latter was designed for a different business model, that of exchange, and not one based on use. Instead, she argues for the use of digital technologies

as an enabler for component change during the use context (see theme 4).

4.3. Theme 3: value co-production and value co-creation

Our findings point to another divergence; that of the difference between co-creation and co-production. Under Type 2 research, co-production is seen to be the customer's involvement in the creation of a company's core offering, i.e. participation in the design of desired attributes (Etgar, 2008; Parry et al., 2012; Ranjan and Read, 2014). Co-creation however, is seen as the customer's realisation of an offering so as to obtain the beneficial outcomes in use. Although a distinction between the two can be drawn theoretically, in reality it may become blurred (Jacob and Rettinger, 2011). Indeed, Vargo (2008) states that co-creation should be viewed as superordinate to co-production; i.e. customers must necessarily co-create value in their context, but may not have contributed to the design of a firm's offering through co-production (Ng and Smith, 2012).

The distinction is best understood by considering the context and who is attributed as the beneficiary. The utilisation of customer resources increases from co-production to co-creation (Ng and Smith, 2012). For example, during co-production the offering is designed in the firms' context and requires greater utilisation of firm resources. So whilst co-production may eventually result in greater efficacy for customers to achieve desired outcomes, at this stage it can be argued that the firm garners the greatest benefit and thus can be viewed as the beneficiary. However, the achievement of outcomes during co-creation in the customers' context will require greater utilisation of the customers' resources. To clarify this concept within the Type 2 approach, the authors offer the following definitions synthesised from the extant literature (Etgar, 2008; Vargo, 2008; Ng and Smith, 2012):

- Co-production is the customer's involvement in the formation of a company's core offering (optional);
- Co-creation is the beneficial realisation of that offering in use (requisite);
- Co-creation is superordinate to co-production.

It is important to note that although Type 1 literature does not acknowledge value co-creation, it does use the term co-production (Brax, 2005; Morelli, 2009; Wilkinson et al., 2009; Kowalkowski et al., 2012), albeit normally undefined as a catch-all term for customer involvement in the process of enabling solutions. For instance, Windahl et al. (2004) cite the importance of co-production in the development of integrated solutions without an explicit definition of the term, instead using it to refer to 'client interaction' and informational exchange between the firm and customer. Morelli (2009) takes a more encompassing definition, stating that the customer should no longer be considered as destroyers of value but rather as co-producers of value, which leads the author to suggest that companies should focus on the "*physical space in which value is co-produced*" (p. 570). Co-production here is then taken to be the enactment of value production, akin to the concept of co-creation in Type 2 literature. In this way the point of departure between the two streams appears to be value co-creation, in that Type 2 literature considers it as being separate from co-production.

4.4. Theme 4: contextual variety and complexity

Our findings also show another divergence in terms of the importance of context. Chandler and Vargo (2011) define a particular context as a unique set of actors with reciprocal links among them, where actors are any social or economic entity whose resources are integrated into the value-creating system. Taking this definition of context, Type 2 research considers a firm's resources as forming only part of a customer's value-creating system contributing towards the customer's outcome. Thus, the firm's offering (which aims to support a given customer's value-creating system) will be subject to a variety of contextual use scenarios both between and within the different value-creating systems (Ng et al., 2012a). As these contexts of use cannot be exhaustively known prior to their occurrence, Batista et al. (2013) state that contextual variety can therefore exhibit complexity, necessitating the development of offerings that address ways to attenuate such variety.

Within a Type 2 conceptualisation, Ng and Briscoe (2012) note that each physical product offering is therefore a trade-off between different sets of possible contexts. In this way, a physical product offering can be viewed as having fixed boundaries and thus possess low tolerance to contextual variety. For a servitized manufacturer, post-manufacturing service activities can help to attenuate unexpected variety as it arises. However, a reactive approach becomes increasingly expensive under conditions of high variety (especially when the product offering resides in the customer's context) and can ultimately threaten the firm's viability due to a lack of scalability (Smith et al., 2014).

Under a Type 1 approach, complexity is primarily seen to stem from service activities. Hence, the transition along the product-service continuum (from pure product to pure service) creates additional complexity for the firm to manage and with it, increased risk (Smith et al., 2014). This suggests that complexity, as described in Type 1 literature, and contextual variety, as described in Type 2 literature, are similar. Our analysis finds that the terms are nuanced due to their treatment of the customer and therefore, Type 1 research handles complexity conceptually different from Type 2 research. Many authors adopting the Type 1 approach have noted that servitization generates complexity for the manufacturer through the transfer of risk around non-availability and suboptimal product performance (Grubic, 2014), minimisation of downtime (Küssel et al., 2000) and reduction of operational hold ups (Jonsson et al., 2008), to name but a few. This is because Type 1 research considers customer resources as exogenous to servitization, thus complexity from any contextual variety of use must be treated as risks to be managed or mitigated. For example, Tukker (2004) highlights that a pay-per-service PSS would see the firm take over responsibilities that were previously the customer's, e.g., paper and toner supply, repair, maintenance and overhaul and replacement of the product when required. By assuming these responsibilities, the firm is now burdened with additional complexity in its internal operational performance as well as ensuring that the customer's day-to-day business operates efficiently under the new service contract.

To overcome the added complexity of achieving functional solutions, studies have pointed towards usage monitoring (Holmström et al., 2010), remote monitoring technology (Grubic, 2014; Jonsson et al., 2008) and error and diagnostics reporting (Küssel et al., 2000). The majority of our findings suggest that the use of real-time data on product health, usage and performance allow a manufacturer to mitigate risk through improved spare parts decision-making (Kim et al., 2007), training and advice for customers using the equipment for improved productivity (Laine et al., 2010) and better predictive maintenance that improves reliability of the offerings (Moore and Starr, 2006). In identifying these points, we found that the emphasis is solely on the enhancement of the firms' capabilities, be they product performance or service activities, to improve efficiency and mitigate risks associated with the assumption of responsibilities usually taken on by the customer. In focusing on these elements, the aim of a Type 1 (solution-based) approach is to ensure operational efficiency of providing a solution to the customer, who is seen as the passive receiver.

In contrast, the customer endogeneity under a Type 2 (outcome-based) approach focuses not merely on managing or mitigating risks, but also on lessening them through active engagement with the customer. This involves assisting in managing their use or experience, including the variety in context of use, so that the alignment of the firm

and the customer can reduce the complexity caused by variety. For example, Ng et al. (2013) suggest that seven alignments are crucial to the successful enactment of Type 2 offerings: Complementary competencies, congruence of expectations, empowerment, perceived control, behavioural alignment, information alignment and material/equipment alignment. Batista et al. (2013) describe this collaborative relationship as the development of co-capabilities, which they believe allow greater viability and stability for long-term equipment outcomes. Hence, Type 2 focuses primarily on effectiveness and optimising the fit between the context of use and the desired outcome to lessen contextual variety and its challenges. In short, this is achieved by reducing information asymmetry between the firm and customer, by actively managing future uncertainty and incomplete information through ensuring the alignment of their capabilities.

4.5. Theme five: business model of solutions vs outcomes

The fifth divergence presented by our findings was that of business model development. Type 2 research inherently views all servitized business models as outcome based, with the difference being the contractual boundary (Ng et al., 2012a.) Indeed, in employing a Type 2 approach, Smith et al. (2012) propose three value proposition cycles of equipment-based manufacturers seeking to adapt their offerings to maximise value-in-use: 1) recovery – minimising disruption from technology failure; 2) availability – maximising availability of technology; and 3) outcome – better capability to achieve desired outcomes of technology. Tukker's (2004) Type 1 classifications also cite three main categories of PSS dependant on the level of service content: 1) product oriented – predominantly the sale of products with some extra services added; 2) use oriented – the product plays a central role, but ownership is retained by the provider; and 3) result oriented – customer and provider agree on a predetermined result without specifying a predetermined product.

Whilst Smith et al.'s (2012) Type 2 value propositions seem to be analogous to Tukker's (2004) Type 1 PSS classifications, the Type 2 authors use the term 'cycles' to indicate that in reality each value proposition is interlinked in the ultimate achievement of customer outcomes. As a company moves through these cycles, it increasingly facilitates and supports the use experience of the offering, and so requires greater resource contribution to, and appreciation of, the customer value-creating process (Jaakkola and Hakanen, 2013). Thus, the enactment of Type 2 value propositions can be said to be in accordance with Payne et al. (2007)'s outside-in mentality to value propositions design, which Ng and Briscoe (2012) find can increase competitive advantage through increased customer satisfaction.

There is potential for the Type 1 business model of integrated solutions (Brax and Jonsson, 2009) to be misunderstood as being similar to the outcome-based business models of Type 2 (Ng et al., 2013). Both will necessarily entail close collaboration between the firm and the customer. However, the difference between the two lies in the firm's management of customer autonomy and the use of its resources. Type 2 considers customer resources as part of the value-creating system and proposes that since resources are in context, customer resources are better placed to be deployed, as customers would be the first to know when anomalies or variety arise. Accordingly, under outcome-based business models the firm works (through the development of co-capability) to coordinate the customer's resources, so as to allow for more effective use of both parties' resources (Etgar, 2008). So while firm resource contribution increases, for which it gains greater revenue, more efficient resource utilisation provides the opportunity to decrease the overall system cost and enable marginal gains. This process is shown visually in Fig. 1.

Type 2 therefore considers the customer endogeneity in servitization as threefold: 1) to jointly take on the capability of achieving the outcomes; 2) to jointly take on the risks; and 3) to be best placed for contingent assets or capabilities close to the context of usage/experience such that potential resources from the customer would be more cost effective than the firm's. The development of co-capabilities however, requires the transformation of resources from both parties, which has the potential to cause emergent effects within the value-creating system. Accordingly, Ng et al. (2009) state that the firm must develop the capability to manage customer autonomy.

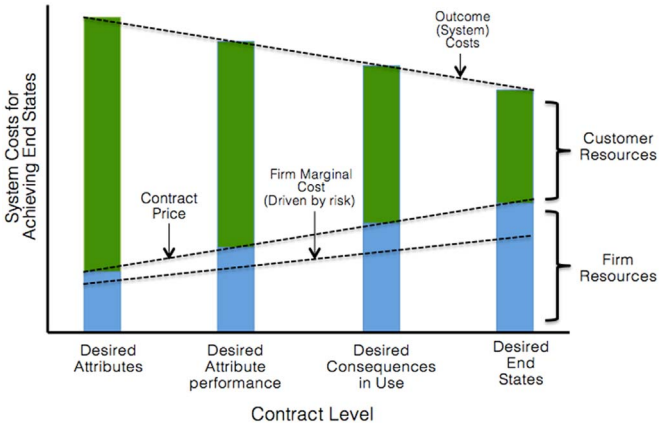

Fig. 1. Marginal Gains from Outcome-Based Contracts.

Given that the customer is considered as exogenous under a Type 1 approach, our findings suggest that rather than managing customer autonomy, Type 1 business models seek instead to control it through rigidity. Ng et al. (2009) posit that the notion of delivering value-in-use in the form of integrated solutions implies that the firm is responsible for the entirety of the outcome, alongside its risks. Indeed, this is signified by Miller et al. (2002)'s statement that in order to preserve price premiums, the firm must "*always work to stay ahead of clients – and some may have to keep secrets from them*" (p. 8). To mitigate the risks of high variety of 'solutions', rigidities and clear boundaries would need to be specified. Type 1 literature show that these could be contractually-defined performance levels (Zaki and Neely, 2014) such as those that ensure asset availability under a risk – and revenue-sharing contract (Baines et al., 2009b). For example, Datta and Roy (2009) highlight that the UK Ministry of Defence is shifting towards availability contracts in their aerospace divisions, which require an agreed level of readiness of equipment to be assigned. The assignment of a readiness level is a clear boundary surrounding the solution that the firm has to provide.

Ng and Briscoe (2012) note that outcome-based contracting (OBC) has three major changes to traditional (Type 1) business models. First, alignment to a common outcome reduces opportunistic firm behaviours (e.g. planned obsolescence) and elicits desired customer behaviours (i.e. correct usage); together they potentially reduce long-term servicing costs. Second, the firm bears a greater proportion of the risks associated with achievement of outcomes in the customer value-creating system. This allows the opportunity for more effective resource utilisation, through which the firm can earn greater margins. Third, achievement of the coordination role in OBC constitutes an additional competency for the firm that may result in increased market share through a proliferation of similar contracts. This can incentivise a firm above and beyond the contractual terms to pursue the achievement of outcomes, thus further reinforcing mutual alignment. In this way, while solution-based Type 1 approaches for servitization business models may be appropriate for closed system problems with objective measures and low variety, an outcome-based Type 2 approach may be more appropriate when the desired end states are complex, high variety, uncertain or emergent.

5. Discussion and reconciliation

The creation of value is the core purpose of any economic activity

and as such, forms the basis of competitive advantage (Vargo et al., 2008; Ng and Smith, 2012). It is then a logical assumption that a thorough understanding of value-creating processes is crucial for any organisation interested in servitization. Our paper brings to the fore the differences in the understanding of value, demonstrating that two conceptualisations of value creation have resulted in five major areas of divergence which divide servitization literature into two approaches. However, we posit that these divergences are not irreconcilable.

We argue that for the firm, value is always in the exchange, only because the latter generates valuable revenues. For customers, value is always in the experience, in the way that experience and usage create outcomes valuable to them (Ng, 2013). Therefore, if one does not assume an overarching transcending notion of value, but discusses it as a construct attributable to an entity as perceived by another entity i.e. the value of what to whom, then value-in-exchange is the value of revenues to the firm, and value-in-use is the value of experience/use to the customer. The divergences are therefore underpinned by the focal decision and logic of which is the supra-set. In the case of Type 1, value-in-exchange is the supra-set, with use sitting within it. In Type 2, value-in-use is the supra-set, with exchange sitting within it. Conceptualising the logic of Type 1 and Type 2 supra-set in this way thus lends support to Payne et al.'s (2007) notion of inside-out or outside-in value propositions, respectively. From the study, we propose reconciliation and recommend situations when a Type 1 or Type 2 approach is most beneficial and appropriate for research:

Adopting a Type 1 Approach is most appropriate when a firm embraces the following mindset:

1) Value-in-use is *delivered* by the firm and its value proposition has embedded value (Baines et al., 2009a);
2) The addition of service contracts is an extension of the firm's manufacturing capability – that is, service is a bolt-on (Vandermerwe and Rada, 1988; Baines et al., 2009a; Turunen and Neely, 2012);
3) The design of PSS is seen as a linear transition, with risk primarily stemming from service content (Tukker, 2004).
4) The service is focused on efficiency gains for both the firm and the customer, meaning that the offering's design remains functionally rigid and the value proposition has a low tolerance for variety across a range of contexts of use. (Swanson, 2001; Kim et al., 2007; Johnson and Mena, 2008)

Adopting a Type 2 approach is most appropriate when a firm embraces the following mindset:

1) Value-in-use is co-created, with the customer an active participant and contributor to value creation during the use of the offering (Prahalad and Ramaswamy, 2000; Frow et al., 2015).
2) All value propositions are inherently focused on outcomes, thus serving the customer across different contexts of use becomes a priority (Ng and Briscoe, 2012; Smith et al., 2012).
3) The formation of the offering requires the design and management of the service system as a whole. However, since the firm does not have control over all resources, management of customer engagement and autonomy through the establishment of co-capability is key to managing contextual variety (Smith et al., 2014).
4) The service is focused on effectiveness for both the firm and customer, meaning that the design of the offering exhibits open and flexible functional boundaries. This results in the value proposition having a high tolerance for variety across a range of contexts of use (Ng et al., 2014; Henfridsson et al., 2014).

Deriving these conditions from the extant literature allows for clarity in understanding the differences (in the design and enactment of servitized offerings) between the two conceptualisations of value. Furthermore, it enables us to draw the conclusion that the two approaches are not necessarily competing ideals, but rather, that each approach may be better suited to different industries. Our findings showed that the two approaches place emphasis on different aspects of the design and enactment of servitized offerings; namely efficiency under a Type 1 approach, and effectiveness under a Type 2 approach. Implicit to these findings was the 'problem' in question. For example, we found the Type 1 approach to be more appropriate when objective measures and low variety were present. Such a system can be represented by the industrial fastening industry in which manufacturers employ servitized offerings to ensure automotive makers receive the necessary components just-in-time (Frank, 2012). Other examples can be found in the publishing and music industries where traditionally physical products have been digitised to allow customers to enjoy these offerings without necessarily 'owning' them, whilst simultaneously reducing marginal costs for the firm (Parry et al., 2012; Vendrell-Herrero et al., 2016). Accordingly, we suggest that a Type 1 approach is more appropriate for industries where the servitized offering can be systematised to ensure efficiency in serving a large number of consumers, exemplified under such scenarios as reducing platform downtime and improving supply chain responsiveness (Kim et al., 2007; Jonsson et al., 2008; Grubic, 2014).

Conversely, Type 2 literature focuses predominantly on large-scale capital equipment where end states are complex, high variety, uncertain or emergent. For example, such as the outcome-based contracts employed by Rolls-Royce in which the affordance of the offering was changed to serve the customer across different contexts of use (Ng and Briscoe, 2012; Batista et al., 2013). Effectiveness and outcomes are continually emphasised as key elements of servitization. However, Type 2 literature has acknowledged that this increases contextual variety of use, in turn implying that the firm relies on the human resource to absorb the variety (Smith et al., 2014). It is acknowledged that this approach is not easily scalable or replicable, meaning that serving outcomes becomes increasingly complex (Ng et al., 2014). As such, we suggest that at least presently, a Type 2 approach is better suited to high-value, customized offerings with a relatively low number of consumers. This could be set to change, however, with recent literature highlighting that the design of the offering can allow customers to configure the offering themselves, thus removing the firm's reliance on the human resource. Increased digitisation could allow firms to increasingly challenge the dominant design of physical and reconfigurable products (Henfridsson et al., 2014) and change the way the consumption of offerings occurs (Hylving and Schultze, 2013). The following section discusses this in further detail.

Interestingly, smart phone and automotive manufacturers are examples that could sit between these two approaches. Both show a high level of output in terms of physical products, but also look for effectiveness in terms of the customer experience, primarily through the integration of digital layers (e.g. the app store and the connected car) that allow for customisability (Ng, 2013). Within such analogous (middling) industries, the firm could adopt either approach to servitization, albeit with strategic implications on the change of their business model focus.

The above discussion leads us to offer the following corollary:

The differing underlying assumptions of value creation between traditional and customer co-created servitization serve to predominantly focus the design and enactment of servitized offerings on efficiency and effectiveness, respectively. Type 1 (traditional) is therefore more appropriate under conditions of low-use variety with systemised offerings. Type 2 (CCoS) is more suitable for higher-use variety with customisable offerings.

Such a finding constitutes our contribution to mid-range theory in S-D logic, as it shows that the application of the logic's principles renders not only a fundamentally different conceptualisation of servitization, but also alters the focus of the servitized firm from efficiency to

effectiveness. This shift in focus is arguably strategic; to concentrate on the effectiveness rather than the efficiency of the servitized offering is implicitly a differentiation choice. In this way our findings concur with the proposition of Vargo and Lusch (2016) that the primary implications of S-D logic are strategic, enabled through innovative insight. Moreover, in a recently published article, Vargo and Lusch (2016) introduce a new fundamental proposition of S-D logic: "*Value co-creation is coordinated through actor-generated institutions and institutional arrangements*" (p. 18). In this proposition, the authors define institutions as *"rules, norms, meanings, symbols, practices, and similar aides to collaboration",* and institutional arrangements as *"interdependent assemblages of institutions*" (p. 6). We find support for this proposition within our thematic analysis. As discussed, Type 2 literature stresses the importance of developing co-capabilities in order to develop greater viability and stability in achieving outcomes (Batista et al., 2013). Consider the achievement of outcomes to be value co-creation, the development of co-capabilities to be institutional arrangements, and factors that affect the development of co-capabilities (e.g. congruence of expectations, empowerment, perceived control, behavioural alignment, etc.) to be institutions (Ng et al., 2013). It is then easy to draw parallels between our findings and the proposition put forth by Vargo and Lusch (2016). Thus our findings additionally identify empirically-derived research outcomes that, at least within the domain of servitization, substantiate this new fundamental proposition. As stated by Brodie et al. (2011), mid-range theory bridges empirical finding and general theory. Our findings do just this, directly contributing through the development of propositions associated with mid-range theory in S-D logic, so that future empirical research may explicitly investigate, verify or modify our findings.

6. Managerial implications: rise of digitisation and the internet-of-things

One major implication of our study point to a direction where a Type 2 servitization approach may be useful. Recently, the literature has seen a number of authors suggest that digitisation will change the nature of offerings and make them much more flexible at the point of use (Coreynen et al., 2016; Vendrell-Herrera et al., 2016). Indeed, Coreynen et al. (2016) suggest a value servitization that enables firms to use digitisation to reduce the load of customers from certain activities, thereby increasing its attractiveness and reducing risk of consumption. Ng et al. (2014) suggest that a product designed with fixed boundaries is not competent across contexts and that it suffers from three challenges: 1) the rigid boundaries make it functionality static; 2) the exchange lacks information of the desired outcome (asymmetric information); and 3) the firm is not present in context, which obstructs it from serving context. Rather, Ng et al. (2014) suggest that a digitised offering overcomes these challenges. This is supported by Henfridsson et al. (2014), who say that increased digitisation will allow manufacturing firms to embed a digital service layer within their offering, enabling re-programmability. This re-programmability means a product is 'incomplete' (Yoo et al., 2010), as it can be continuously modified even after it has been transferred to the customer (Davies and Ng, 2015), changing the way the offering is consumed (Hylving and Schultze, 2013). By designing an offering as incomplete, the boundaries between the digital and material become much more fluid and the functionality of the offering could be altered by the customer via 3D printing, the Internet of Things (IoT) or digital apps (Maull et al., 2015). Digitisation would therefore allow a firm to design a scalable offering in production and a customisable offering during use because of the boundary between the physical and digital layers (Ng, 2013). Customers are now able to develop further co-capabilities and reduce their reliance on the firms' human resource to attenuate variety. This is consistent with Vendrell-Herrero et al. (2016), who found that holding an immutable resource such as a standardised physical product can incentivise optimised collaborative strategies between end-customers and manufacturers through the incorporation of a digital layer. Digitisation therefore allows the firm to embed a reconfigurable service layer within its offerings, changing them from a service with a low tolerance for variety to one with a high tolerance without sacrificing scale economy benefits for the firm. In addition to these reconfiguration methods, the firm can leverage consumption data to design and innovate personalised offerings (Ng et al., 2014) that can then be integrated via the digital layer (e.g. 3D printing, IoT data or digital apps) within the consumption space.

Although many of the papers discussed here are conceptual, empirical work in this space is starting to appear, with two examples highlighting the potential use of data as a service. First, Pogrebna (2015) proposes a new approach to servitization based upon behavioural elements and human data interaction. In her paper, she argues that the assumption of service 'to' rather than 'with active involvement' of the consumer has a range of critical implications for servitization in a digitally-enabled world, because technology will create more empowered consumers. Instead, Pogrebna proposes that a focus on behavioural elements to understand new methods of interaction between consumer and business model is required to develop coherent technology-based service systems. The second example is an exploratory case conducted by Parry et al. (2016), who investigate the use of IoT sensors and data within an individual's home. They highlight that gathering IoT data at the point of use (e.g., the customer's consumption space) allows firms to understand contextualised data (how the product/service is used) and ultimately improve reverse supply chains by having access to use data that enhances supply chain visibility right through to the use of the firm's offering. Both of these papers inherently utilise a Type 2 approach within their understanding of service.

We argue that the future of customer co-created servitization (Type 2) would benefit from the use of data as a service for the customisation and development of functionally incomplete products. First, data of the consumption space can be used to adapt the functionality of the offering to context, by integrating the data directly into the offering. Second, and in a similar fashion, information about the context can be used to print components or download apps within the consumption space for integration with the offering. Finally, customer data can be used by the firm to develop personalised products or services.

7. Conclusions

The thematic analysis presented in our study has elucidated the semantic differences between the two approaches to servitization research, as well as provide a clear understanding of the latent conceptualisations and ideologies from which they stem. Such a study has hitherto been lacking within the established servitization literature. In addressing this gap, we contribute to expediting the discussion around the servitization phenomenon by creating a clear path for future research to take place. Our study explicitly sets out the five major themes of divergence within the literature, how they are understood within the two approaches and how their understanding changes the way in which firms approach the servitization process. The outcome of these latent, and consequently, semantic differences manifests conditions under which one may be more appropriate than the other; namely in the pursuit of efficiencies (Type 1) or effectiveness (Type 2). That is not to say that either approach focuses solely on one of these pursuits, but rather, that adoption of a respective mindset may be more beneficial when either the efficiency or the effectiveness of a servitization strategy is the main criteria under question. This further contributes to the literature as it enables researchers to better understand the mindset of the firm they are studying and advise on the key conceptual issues that need to be identified and addressed in order to pursue one such approach against the other.

Future researchers should therefore be able to identify organisational changes and servitization strategies required based on the approach they adopt. Great strides have already been made in these

areas e.g., Pawar et al. (2009); Martinez et al. (2010); Smith et al. (2014). However, the strategic and organisational changes introduced as a result of digitisation has received little attention and would therefore be a fruitful area of research. Beyond the strategic and organisational changes, we have identified a number of key areas for research based on data as a service and increased digitisation. Much of the servitization literature focuses on traditional manufacturing e.g., capital goods equipment. We have found that with the increased amount of data produced and the huge influx of IoT items, servitization of the home is an emerging area of research e.g., Ng et al. (2014); Pogrebna (2015); Parry et al. (2016). However, the research directions we identify do not have to be applied specifically to the home and can be extended to capital goods firms. We break down the future research directions into three main areas: 1) how can data about the consumption space be used to adapt the offering's functionality to context, by directly integrating data into the offering (serving the customer at the point of use); 2) how can information about the context be used to print components or download apps within the context of use; and 3) how can customer data be used to design personalised products or services so that the firm can serve individuals across different times and space.

This research not without its limitations. First, within the literature there is a plethora of terms used to describe servitization. Whilst we used as many keywords as possible, we anticipate that we may have missed some key terms and as such, may have overlooked a small number of publications in the area. In addition, the bulk of our analysis focuses on literature dating from 2004 when S-D logic was first published. Although we do include a few important papers pre-2004, it is possible we may have missed some important contributions to the field by focusing our search to this time period.

Our paper serves to contribute to the growing research community in servitization. We believe that the servitization knowledge domain has much to contribute to the future of the digital economy and the IoT, and we hope to continue the conversations through the clarifications set out in this paper.

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Appendix

Theme One - Value

Type 1	Type 2
Vandermerwe and Rada, 1988. The point however is that a larger component of the added value in customer offerings is going into services. And since the primary objectives of business is to create wealth by creating value, “servitization” of business is very much a top management issue.	Prahalad and Ramaswamy, 2000. Customers are stepping out of their traditional roles to become cocreators as well as consumers of value.
Tukker, 2004. The ability to create and capture sustained added value (often referred to as shareholder value) is often seen as the key measure of success of business. (…) The creation of (tangible and intangible) value alone is not sufficient. The PSS provider (network) should be powerful enough to capture this value as well	Pawar et al. (2009). This means that what is sold is not the manufactured product, but the benefit or “value” which customers derive from the product, and associated services.
Neely, 2008. A servitized organisation designs, builds and delivers one or more integrated product and service offerings that deliver value in use.	Ng et al, 2010. Through a review of the philosophical, axiological and economic foundations of value, this paper axiomatically proposes value to be a naturally occurring property, phenomenologically determined entirely by the perceiver(s) ‘in-use’ (i.e. in experience).
Baines et al., 2009a. The main part of total value creation was considered to stem from physical goods, and services were assumed purely as an add-on to products	Grönroos and Helle, 2010. Invariably value for customers and value for the firm are discussed and analyzed separately as separate, non-interactive phenomena. However, the value a supplier can create in a business engagement with a customer is dependant of the value that this customer can create from being involved in the same relationship. Hence, in this paper, in this sense value is considered a mutually created phenomenon.
Bastl et al., 2012. In this paper we define integrated solutions in line with Davies (2004) and Wise and Baumgartner (1999), where an “integrated solution combines products and services into a seamless offering that addresses customer’s business or operational needs.	Smith et al., 2014. A firm cannot ”satisfy” a customer; they can only collaboratively support value co-creation. (…) This means that both the firm and the customer are accountable in achieving value-in-use – the former through its value propositions be they direct (human activities) or indirect (through product) and the latter through its realisation of the propositions.
	Smith et al., 2014. Whilst PSS recognises that customer value is achieved through use, much of its development has been achieved through the lens of product-based thinking. This was evidenced in a PSS setting by Johnstone et al. (2009), who found an embedded engineering culture of “product centricity” present in a firm considered exemplar in its transition from manufacturing to PSS, and it was manifested in a lack of understanding of customer “needs”. This product-based thinking is often termed as a goods-dominant logic (G-D logic).

Theme Two – Design of Servitized Offering

Type 1

Oliva and Kallenberg, 2003. Our analysis of the actions taken by the firms found a recurring pattern on the adoption of IB services. The observed commonalities were not in the specific service provided, but in the nature of the service contracts and in their adoption sequence. Furthermore, our analysis suggests that the transition occurs in stages, and from these we developed a process theory for the transition (see Fig. 1). During each stage, the firm focuses on a set of issues and addresses them through the development of new capabilities.

Tukker, 2004. The trick then becomes to satisfy needs on these higher levels in conjunction with the offer of a material artifact: 'turning ordinary products into extraordinary experiences'. By creating such intangible added value, the provider makes the client willing to pay more than would be justified on the basis of 'rational' calculation.

Baines et al., 2009a. the process of creating value by adding services to products

Baines et al., 2009a. servitization is the innovation of an organisations capabilities and processes to shift from selling products to selling integrated products and services that deliver value in use

Brax and Jonsson, 2009. To increase business, solution providers continuously develop additional features for the basic offerings.

Martinez et al., 2010. There are various forms of servitization such as the categories that Tukker proposes (2004). They range from products with services as an 'add-on', to services with tangible goods.

Caldwell and Howard, 2011. The growing emphasis on service and support indicates a need for greater appreciation of the process, skills and knowledge needed by firms to translate capability into extended revenues from services, and to shake off the view that value is more closely linked to physical activity and goods production than services with their traditional associations of intangibility and ease of transferability.

Bastl et al, 2012. We showed that relationship specific adaptations were a direct result of a need to increase the effectiveness of Provider's provision of integrated solutions.

Type 2

Payne et al., 2007. In traditional business strategy models, suppliers make decisions and choices about which core business or product category they should be operating in. The view is clearly inside–out, as it is based largely on the understanding of current organisational competencies. In S-D logic, business strategy starts by understanding the customer's value- creating processes and selecting which of these processes the supplier wishes to support. (...) Planning for co-creation is outside–in as it starts from an understanding of the customer's value-creating processes, and aims at providing support for better co-creation of value

Grönroos and Helle, 2010. In practice, adopting a service logic would mean that all activities and processes of a supplier that are relevant to its customer's business are coordinated with the customer's corresponding activities and processes into one integrated stream of actions, with the aim to support the customer's processes, and eventually the business outcome.

Holmström et al., 2010. Asset flexibility is improved for equipment users when OEMs can upgrade and replace assets according to changing business needs. Constellation III is based on assets being "specific-use" for equipment users but "multi-use" for OEMs.

Ng and Briscoe, 2012. Our study showed that the difficulty in the change of business model may lie not merely in the activities of service personnel, or in processes that surround the asset, but in the design and engineering of the asset itself to support activities of service personnel in combination with customer resources. Consequently, if the asset was originally designed towards a different set of boundaries i.e. the firm is only responsible until the ownership was transferred, it may need to be redesigned with this new set of boundaries where both are now responsible for co-created outcomes.

Smith et al., 2014. Consequently, whether benefits to customers are attained through tangible products or human activities, a customer-focused orientation would focus on value-in-use from the outcomes enabled by product or service activities.

Theme Three – Value Co-production and Value Co-creation

Type 1

Windahl et al, 2004. An ongoing dialogue is established between customers and technology development, as the basis for a relationship with strong elements of co-production (...) we believe that product-focused companies moving towards supplying integrated solutions would over time need to orient themselves towards the interact co-producing mode. Client involvement is often seen as a fundamental aspect of knowledge-intensive service activities, and the notion of co-production developed in service management studies is highly relevant to firms offering integrated solutions.

Brax, 2005. As services are processes, communication with the customers is needed throughout the service relationship. The role of this communication is to support the service co-production, and therefore the manufacturer needs to express care instead of opportunism.

Type 2

Prahalad and Ramaswamy, 2000. Customers are stepping out of their traditional roles to become cocreators as well as consumers of value.

Grönroos and Helle, 2010. Interactions provide value co-creation opportunities for the supplier, because the supplier's and its customer's processes do not run in parallel only, but merge into one interactive process. The customer takes actions as co-producer inside the supplier's practice or process, and simultaneously the supplier takes actions inside the customer's corresponding process, and hence, is also directly engaged in the customer's value-creating process, and can perform actively

Brax and Jonsson, 2009. In integrated solutions, value is created incrementally through the customer-provider co-production process. Building integrated solutions business requires managing the interdependence of the solution components – both within the provider company and the offering, and between the provider and the client – to enable this collaborative process.

Brax and Jonsson, 2009. Integration is not just a phrase to sell the idea of full service to clients. It is a necessity even for the provider to be able to deliver solution offerings, i.e. to fully solve a need in relation to a specific function or task in the client's business system. (...) integration refers to co-design and management of the different subsystems within the solution offering.

Morelli, 2009. The new role of business companies is now to organise value creation, in the perspective of considering customers no longer as the end of pipe of the production process (i.e. as consumer, and therefore destroyers of the value created by the chain of production and distribution processes), but as co-producers of value. This new role extends business companies' interest far beyond their formal boundaries, out in the logical and physical space in which the value is co-produced

Kowalkowski et al., 2012. The nature of service infusion requires a matching of available competencies and assets (strategies) to the demands (ends) of customers. Interaction, co-production, and continuous means-ends adjustment are key characteristics of many services. Especially in the case of advanced services, coordinating and mutually adjusting the means and ends of both customer and provider become critical.

as part of that process

Guo and Ng, 2011. There is a distinction between value co-creation and service co-production though both imply the involvement of the customer and the firm. With S-D logic, value is viewed as customer value, which is proposed by the firm and unfolded by the customer over time. Nevertheless, service co-production is a process where the customer and the firm work together to deliver service outcomes

Frow et al, 2015. Resource integration involves a process of ongoing combination of resources by actors (resource integrators) in co-creating value

Parry et al, 2012. Co-production requires that the customer plays an active role in developing the service offering (Lovelock and Wirtz, 2004) and this further allows them to co-create value, drawing upon different resources to attain desired outcomes

Frow et al, 2015. Co-production is generally viewed as a component of co-creation with the term referring to customer participation in the development of the core offering.

Theme Four – Contextual Variety and Complexity

Type 1

Oliva and Kallenberg, 2003. Pricing equipment availability requires the service provider to assume the equipment's operating risk, i.e. pricing will be based either on the opportunity cost of machine failure, or the traditional maintenance cost for the end-user's maintenance organisation.

Tukker, 2004. The PSS still has a fairly common product as a basis, but the user no longer buys the product, only the output of the product according to the level of use. Well-known examples in this category include the pay-per-print formulas now adopted by most copier producers. Following this formula, the copier producer takes over all activities that are needed to keep a copying function in an office available (i.e. paper and toner supply, maintenance, repair and replacement of the copier when appropriate).

Baines et al, 2007. With a PSS, asset ownership is not transferred to the customer. In the case of the photo-copier, the producer would typically provide 'a document management solution'. Then the producer, rather than the customer, would select and provide the equipment and consumables, monitor performance, and carry out servicing and disposal. In return they receive payment as the customer uses the printing capability.

Jonsson et al., 2008. Urgent problems or errors could be discovered by occasional readings of different parameters, but in order to prevent breakdowns, MacGregor will also perform analyses of longer time sets to draw conclusions about what is about to happen. In this solution, MacGregor will act alone in processing the collected data. The customer will be rather passive, either receiving a report with detected problems or, depending on the service agreement, waiting

Neely, 2008. From a supplier perspective, servitization of a way of increasing sales revenues, while from a customer perspective servitization offers a route of reducing risk and decreasing or a least stabilising and making predictable maintenance and support costs.

Type 2

Ng et al, 2009. This transactional model is replaced in a outcome-based context where the customer and firm are working closely to introduce variety through changing usage thus the past is not a good predictor of the future. This introduces variety into the system by the customer demanding different things at different times and having different capabilities and levels of effort.

Ng et al, 2012a. Contextual variables may arise from changes in the physical environment, originating either from the provider and/or from the customer themselves. In using technology, there could be a number of contextual factors affecting value creation, and such contextual factors will create contextual variety in the way technology is used, even by the same individual. This is what we term Contextual Variety.

Ng and Briscoe, 2012. Since contextual variety of use will impact upon the firm's value propositions, achieving outcomes of use as part of contract performance can become increasingly complex, even threatening the firm's future profitability and continued viability. Therefore, firms need to re-organise themselves to maintain viability, and manage the complexity that can emerge from such service systems.

Smith et al, 2012. The nature of customer inputs and the need to attend to variety of use become a joint activity with different set of processes linking the providers.

Batista et al, 2013. A first aspect we recognise is that contextual variations coming from the external environment of a system, as well as the multitude of events that may arise within the system itself, confront the system with 'variety'. Contextual variety as described here is a measure of complexity, for it represents the number of different states in a system

Neely, 2008. Managing and controlling long-term risk and exposure in these partnerships, as well as modelling and understanding their cost and profitability implications is a significant challenge.

Baines et al., 2009a. Risk also needs to be considered in the design process as undertaking activities previously performed by customers can present new challenges…marginal risk incurred might outweigh the benefits of increased profit potential.

Grubic, 2014. This change brings lots of challenges with a transfer of risks, from a customer to a product manufacturer, being the most important one. The primary risks incurred by the manufacturer are non-availability and suboptimal product performance.

Visnjic and Van Looy, 2013. In addition, investments in service information systems are necessary to handle the complexity of the service-delivery process to a growing number of customers.

Lightfoot et al., 2013. Risk adoption and value creation appear to be pivotal factors when considering the design of service oriented market propositions. The manufacturer's risk increases as the organisational focus moves from tactical (e.g. extended warranty) through to strategic (e.g. GE providing operational support for their medical equipment).

Smith et al, 2014. As a firm transitions from product to P-S, contextual use variety increases.

Theme Five – Business Models of Solutions vs Outcomes

Type 1

Miller et al., 2002. The value of solutions to clients is clear: superior or simplified operations, cost savings, performance guarantees, convenience, customized service, and state-of-the-art offerings.

Davies, 2004. These authors argue that competitive advantage is not simply about providing services, but how services are combined with products to provide high-value 'integrated solutions' that address a customer's business or operational needs.

Brax and Jonsson, 2009. Integrated solutions are complex and customized offerings that extend beyond mere bundles of services and products (Johansson et al., 2003). These solutions can create value by improving operating efficiency, increasing asset effectiveness, enabling market expansion, and mitigating risk.

Lightfoot et al., 2013. Tukker's (2004) model of a product-service spectrum illustrates differing forms of product-service systems business models or value propositions. These include product oriented services, use oriented services, and result oriented services. This framework is, however, typical of many in the PSS literature in that it tends to focus on the features and examples of the offering, and whilst useful in terms of organisational positioning, it is of limited value in the development of strategy.

Zaki and Neely, 2014. By a complex service we mean the provision of a set of technical capabilities based on a complex system to a customer at a contractually-defined performance level.

Type 2

Ng and Briscoe, 2012. Overall, new business models can be seen as more customer centric (Mansfield & Fourie, 2004), taking on new forms of collaboration for value creation that necessitates a systems perspective (Seddon et al, 2004). It is also seen as a change in the unit of analysis from the firm to the value-creating system, which spans boundaries (Zott and Amit, 2010), and the need to focus on organisational activities that contribute to that system. This is the case with outcome-based contracts

Ng et al, 2012a. While it is useful to view a system as a set of entities, the fundamental understanding of why a system is a service system is that it aims for value to be an outcome, regardless of whether such a value is commercial, intrinsic, explicit, co-created or multi-faceted.

Smith et al, 2014. Delivery of availability and outcome value propositions requires customer resource integration.

Ng et al, 2013. From the delivery standpoint, OBC is unlike traditional service contracts where there is a sequential process (call comes in, processes triggered, equipment repaired, activities invoiced). In OBC, there is usually no sequential 'value chain' to speak of; effective equipment use is a consequence of collaborative processes and practices with the customer in a value-creating system to achieve positive outcomes.

Frow et al, 2015. Co-creation changes the locus of value creation from inside the company to collaborative interactions that lie beyond the firm boundaries. This perspective requires new business models, identifying the practices that assist a firm in coordinating those interactions that lead to an increase in resource density across multiple actors.

References

Aston Business School, 2013. Servitization impact study: How UK based manufacturing organisations are transforming themselves to compete through advances services. Retrieved from ⟨https://connect.innovateuk.org/documents/416351/3926914/Servitization+impact+study.pdf⟩.

Baines, T.S., Braganza, A., Kingston, J., Lockett, H., Martinez, V., Michele, P., Wilson, H., 2007. State-of-the-art in product service-systems. IMechE Proc. Part B: J. Eng. Manuf. 221 (10), 1–11.

Baines, T.S., Lightfoot, H.W., Benedettini, O., Kay, J.M., 2009a. The servitization of manufacturing. J. Manuf. Technol. Manag. 20 (5), 547–567.

Baines, T.S., Lightfoot, H.W., Kay, J.M., 2009b. Servitized manufacture: practical challenges of delivering integrated products and services. Proc. IMechE Part B: J. Eng. Manuf. 223 (9), 1207–1215.

Barnett, N., Parry, G., Saad, M., Newnes, L., Goh, Y., 2013. Servitization: is a paradigm shift in the business model and service enterprise required? Strateg. Change 22 (3/4), 145–156.

Bastl, M., Johnson, M., Lightfoot, H., Evans, S., 2012. Buyer-supplier relationships in a servitized environment. Int. J. Oper. Prod. Manag. 32 (6), 650–675.

Batista, L., Davis-Poynter, S., Ng, I.C.L., Maull, R., 2013. Transformation of provider and customer organisations to achieve co-capability in outcome-based contracts: a viable service systems approach. In: Proceedings of the 31st Spring Servitization Conference, pp. 196–202.

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3 (2), 77–101.

Brax, S., 2005. A manufacturer becoming service provider – challenges and aparadox. Manag. Serv. Qual.: Int. J. 15 (2), 142–155.
Brax, S.A., Jonsson, K., 2009. Developing integrated solution offerings for remotediagnostics. International J. Oper. Prod. Manag. 9 (5), 539–560.
Brodie, R.J., Saren, M., Pels, J., 2011. Theorizing about the service dominant logic: the bridging role of middle range theory. Mark. Theory 11 (1), 75–91.
Bustinza, O.F., Bigdeli, A.Z., Baines, T., Elliot, C., 2015. Servitization and competitive advantage. Res. Technol. Manag. 58 (5), 53–60.
Caldwell, N., Howard, M., 2011. Procuring Complex Performance: Studies of Innovation in Product-Service Management. Routledge, New York, NY.
Chandler, J.D., Vargo, S.L., 2011. Contextualization and value-in-context: how context frames exchange. Mark. Theory 11 (1), 35–49.
W. Coreynen P. Matthyssens W. Van Bockhaven Boosting servitization through digitization: pathways and dynamic resource configurations for manufacturers Industrial Marketing Management. Ind. Mark. Manag., 2016.
Daly, J., Kellehear, A., Gliksman, M., 1997. The public health researcher: a methodological approach. Oxford University Press, Melbourne, Australia.
Datta, P.P., Roy, R., 2009. Cost modelling techniques for availability type service support contracts: a literature review and empirical study in: Proceedings of the 1st CIRP Industrial Product-Service Systems (IPS2) Conference. Cranfield University.
Davies, A., 2004. Moving base into high-value integrated solutions: a value stream approach. Ind. Corp. Change 13 (5), 727–756.
Davies, P., Ng, I.C.L., 2015. Moving towards the incomplete: a research agenda for future products in the digital economy. Procedia Manuf. 3, 3368–3374.
De Gregori, T., 1987. Resources are not; they become: an institutional theory. J. Econ. Issues 21 (3), 1241–1263.
Dinges, V., Urmetzer, F., Martinez, V., Zaki, M., Neely, A., 2015. The future of servitization: technologies that will make a difference. Cambridge Service Alliance Executive Briefing Paper.
Etgar, M., 2008. A descriptive model of the consumer co-production process. J. Acad. Mark. Sci. 36 (1), 97–108.
Fereday, J., Muir-Cochrane, E., 2006. Demonstrating rigor using thematic analysis: a hybrid approach of Inductive and Deductive coding and Theme development. Int. J. Qual. Methods 1 (5), 80–92.
Frank, N., 2012. A Service Revolution in Fasteners: The Story of Two Businesses with the Same Goal but Very Different Strategies. In: Theodoulidis, B., Tan, Y.L., Macaulay, L. (Eds) (2012). Case Studies in Service Innovation CSSI'12, Workshop from In: Proceedings of the 24th International Conference on Advanced Information Systems Engineering (CAiSE'12), Gdańsk, Poland. 26 June 2012. pp. 14–20.
Frow, P., Nenonen, S., Payne, A., Storbacka, K., 2015. Managing co-creation design: a strategic approach to innovation. Br. J. Manag. 26, 463–483.
Gebauer, H., Fleisch, E., Friedli, T., 2005. Overcoming the service paradox in manufacturing companies. Eur. Manag. J. 23 (1), 14–26.
Gebauer, H., Gustafsson, A., Witell, L., 2011. Competitive advantage through service differentiation by manufacturing companies. J. Bus. Res. 64 (12), 1270–1280.
Grönroos, C., Helle, P., 2010. Adopting a service-logic in manufacturing. J. Serv. Manag. 21 (5), 564–590.
Grönroos, C., Ravald, A., 2011. Service as business logic: implications for value creation and marketing. J. Serv. Manag. 22 (1), 5–22.
Grubic, T., 2014. Servitization and remote monitoring technology. A literature review and research agenda. J. Manuf. Technol. Manag. 25, 100–124.
Guo, L., Ng, I., 2011. The co-production of equipment-based services: an interpersonal approach. European Manag. J. 29 (1), 43–50.
Heinonen, K., Strandvik, K., Mickelsson, J., Edvardsson, B., Sundström, E., Andersson, P., 2010. A customer dominant logic of service. J. Serv. Manag. 21 (4), 531–548.
Henfridsson, O., Mathiassen, L., Svahn, F., 2014. Managing technological change in the digital age: the role of architectural frames. J. Inf. Technol. 29, 27–43.
Holmström, J., Brax, S., Ala-Risku, T., 2010. Comparing provider-customer constellations of visibility-based service. J. Serv. Manag. 21 (5), 675–692.
Hylving, L., Schultze, U., 2013. Evolving the modular layered architecture in digital innovation: The case of the cars instrument cluster. In: Proceedings of the Thirty fourth international conference on Information Systems, Milan.
Jaakkola, E., Hakanen, T., 2013. Value co-creation in solution networks. Ind. Mark. Manag. 42 (1), 47–58.
Jacob, F., Rettinger, B., 2011. The role of customer co-production in value creation. In Proceedings of the Naples Forum on Service.
Johnson, M., Mena, C., 2008. Supply chain management for servitised products: a multi-industry case study. Int. J. Prod. Econ. 114 (1), 27–39.
Jones, M., Coviello, N., Tang, Y.K., 2011. International Entrepreneurship research (1989–2009): a domain ontology and thematic analysis. J. Bus. Ventur. 26 (6), 632–659.
Jonsson, K., Westegren, U.H., Holmström, J., 2008. Technologies for value creation: an exploration of remote diagnostic systems in the manufacturing industry. Inf. Syst. J. 18 (3), 227–245.
Kim, S., Cohen, M.A., Netessine, S., 2007. Performance contracting in after-sales service supply chains. Manag. Sci. 53 (12), 1843–1858.
Kowalkowski, C., Kindström, D., Alejandro, B.T., Brege, S., Biggemann, S., 2012. Service infusion as incrementalism in action. J. Bus. Res. 65 (6), 765–772.
Küssel, R., Liestmann, V., Spiess, M., Stich, V., 2000. TeleService a customer-oriented and efficient service. J. Mater. Process. Technol. 107 (1), 363–371.
Laine, T., Paranko, J., Suomala, P., 2010. Downstream shift at a machinery manufacturer: the case of the remote technologies. Manag. Res. Rev. 33 (10), 980–993.
Lightfoot, H., Baines, T., Smart, P., 2013. The servitization of manufacturing: a systematic literature review of interdependent trends. Int. J. Oper. Prod. Manag. 33 (11/12), 1408–1434.
Maglio, P., Vargo, S.L., Caswell, N., Spohrer, J., 2009. The service system is the basic abstraction of service science. Inf. Syst. E-Bus. Manag. 7 (4), 395–406.
Martinez, V., Bastl, M., Kingston, J., Evans, E., 2010. Challenges in transforming manufacturing organisations into product-service providers. J. Manuf. Technol. Manag. 21 (4), 449–469.
Maull, R., Godsiff, P., Mulligan, C., 2015. Transitioning to the pull economy: the case of the UK railways. In: Proceedings of the 48th Hawaii International Conference on Service Systems, Hawaii.
Miller, D., Hope, Q., Eisenstat, R., Foote, N., Galbraith, J., 2002. The problem of solutions: Balancing clients and capabilities. Bus. Horiz. 45 (2), 3–12.
Moore, W., Starr, A., 2006. An intelligent maintenance system for continuous cost-based prioritisation of maintenance activities. Comput. Ind. 57 (6), 595–606.
Morelli, N., 2009. Service as value co-production: reframing the service design process. J. Manuf. Technol. Manag. 20 (5), 568–590.
Neely, A.D., 2008. Exploring the financial consequences of the servitization of manufacturing. Oper. Manag. Res. 1 (2), 103–118.
Neely A., Benedetinni O., and Visnjic I., The servitization of manufacturing: further evidence. Proceedings of the European Operations Management Association Conference, 2011, Cambridge, UK.
Ng, I.C.L., 2013. Value & worth: creating new marketing in the digital economy. Innovorsa Press, Cambridge.
Ng, I.C.L., Smith, L.A., 2012. An integrative framework of value. In: Vargo, S.L., Lusch, R.F. (Eds.), 9th edReview of Marketing Research 9. Emerald Group Publishing Limited.
Ng, I.C.L., Briscoe, G., 2012. Value, variety and viability: new business models for co-creation in outcome-based contracts. Int. J. Serv. Sci. 3 (3), 26–48.
Ng I.C.L., Guo L., Scott J., and Yip N.K.T., (2008). Towards a benefit-based framework for understanding business to business services and its impact on contract and capability. In 10th International Research Seminar in Services Management: Marketing, Strategy, Economics, Operations & Human Resources: Insights into Service Activities La Londe, France.
Ng, I.C.L., Maull, R., Yip, N., 2009. Outcome-based contracts as a driver for systems thinking and service-dominant logic in service science: evidence from the defence industry. Eur. Manag. J. 27 (6), 377–387.
Ng, I.C.L., Parry, G., Smith, L., Maull, R., 2010. Value co-creation in complex engineering service systems: Conceptual foundations. In Proceedings of the Forum on Markets and Marketing (FMM): Extending Service Dominant Logic. Cambridge, UK.
Ng, I.C.L., Parry, G., Maull, R., Mcfarlane, D., 2011a. Complex engineering service systems: a grand challenge. In: Ng, I., Parry, G., Wild, P., McFarlane, D., Tasker, P. (Eds.), Complex Engineering Service Systems - Concepts and Research. Springer London, London, 439–454.
Ng, I.C.L., Parry, G., Mcfarlane, D., Tasker, P., 2011b. Towards a core integrative framework for complex engineering service systems. In: Ng, I., Parry, G., Wild, P., McFarlane, D., Tasker, P. (Eds.), Complex Engineering Service Systems - Concepts and Research. Springer London, London, 1–19.
Ng, I.C.L., Guo, L., Ding, Y., 2012a. The use of information technology as value co-creation: the role of contextual variety and means drivenness. The University of Exeter Business School Discussion Papers in Management.
Ng, I.C.L., Parry, G., Smith, L., Maull, R., Briscoe, G., 2012b. Transitioning from a goods-dominant to a service-dominant logic: visualising the value proposition of Rolls-Royce. J. Serv. Manag. 23 (3), 416–439.
Ng, I.C.L., Ding, X., Yip, N., 2013. Outcome-based contracts as a new business model: the role of partnership and value-driven relational assets. Ind. Mark. Manag. 42, 730–743.
Ng, I.C.L., Scharf, K., Pogrebna, G., Maull, R., 2014. Contextual variety, internet-of-things and the choice of tailoring over platforming: mass customisation strategy in supply chain management. Int. J. Prod. Econ. 159 (January), 76–87.
O'Shaughnessy, J., O'Shaugnessy, N., 2009. The service-dominant perspective: a backwards step? Eur. J. Mark. 43 (5/6), 784–793.
Oliva, R., Kallenberg, R., 2003. Managing the transition from products to services. Int. J. Serv. Ind. Manag. 14 (2), 160–172.
Parry, G., Bustinza, O.F., Vendrell-Herrero, F., 2012. Servitization and value co-production in the UK music industry: an empirical study of Consumer Attitudes. Int. J. Prod. Econ. 135 (1), 320–332.
Parry, G., Brax, S., Maull, R., Ng, I.C.L., 2016. Operationalising IoT for reverse supply: the development of use-visibility measures. Supply Chain Manag.: Int. J. 21 (2), 228–244.
Patton, M.Q., 1990. Qualitative Evaluation and Research Methods 2nd ed.. Sage, Newbury Park, CA.
Pawar, K.S., Beltagui, A., Riedel, J.C.K.H., 2009. The PSO triangle: designing product, service and organisation to create value. Int. J. Oper. Prod. Manag. 29 (5), 468–493.
Payne, A.F., Storbacka, K., Frow, P., 2007. Managing the co-creation of value. J. Acad. Mark. Sci. 36 (1), 83–96.
Pogrebna, G., 2015. Servitization through human-data interaction: a behavioural approach (The Spring Servitization Conference). Aston University.
Polese, F., Pels, J., Brodie, R.J., 2011. Theoretical underpinning to succesful value co-creation. In: E. Gummeson, M. Cristina, F. Polese (Eds.), The 2011 Naples Forum on Service - Service Dominant Logic, Network and Systems Theory and Service Science: Integrating Three Perspectives for a New Service Agenda.
Prahalad, C.K., Ramaswamy, V., 2000. Co-opting customer competence. Harv. Bus. Rev. 78, 79–90.
Prahalad, C.K., Ramaswamy, V., 2004. Co-creation experiences: the next practice in value creation. J. Interact. Mark. 18, 5–14.
Ranjan, K.R., Read, S., 2014. Value co-creation: concept and measurement. J. Acad. Mark. Sci. 44 (3), 290–315.
Rice, P., Ezzy, D., 1999. Qualitative research methods: a health focus. Oxford University

Press, Melbourne, Australia.
Smith, L., Ng, I.C.L., Maull, R., 2012. The three value proposition cycles of equipment-based service. Prod. Plan. Control 23 (7), 553–570.
Smith, L., Maull, R., Ng, I.C.L., 2014. Servitization and operations management: a service dominant-logic approach. Int. J. Oper. Prod. Manag. 34 (2), 242–269.
Spohrer, J., Maglio, P., 2008. The emergence of service science: toward systematic service innovations to accelerate co-creation of value. Prod. Oper. Manag. 17 (3), 238–246.
Swanson, L., 2001. Linking maintenance strategies to performance. Int. J. Prod. Econ. 70 (3), 237–244.
Takeyama, M., Tsukui, K., Shibata, Y., 2014. Resource oriented service ideation: integrating S-D logic with service design (In Fourth Service Design and Service Innovation Conference). Lancaster University, United Kingdom.
Thomas, J., Harden, A., 2008. Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Med. Res. Methodol. 8, 1–10.
Tukker, A., 2004. Eight types of product-service system: eight ways to sustainability? Experiences from suspronet. Bus. Strategy Environ. 13, 246–260.
Turunen, T., Neely, A., 2012. Organising servitization: an in-depth case study. Cambridge Service Alliance Working Paper, pp. 1–19.
Vandermerwe, S., Rada, J., 1988. Servitization of business: adding value by Adding services. Eur. Manag. J. 6 (4), 314–324.
Vargo, S.L., 2008. Integration and value creation - paradigmatic traps and perspectives. J. Serv. Res. 11 (2), 211–215.
Vargo, S.L., Lusch, R.F., 2004. Evolving to a new dominant logic. J. Mark. 68 (January), 1–17.
Vargo, S.L., Lusch, R.F., 2008. Service-dominant logic: continuing the evolution. J. Acad. Mark. Sci. 36 (1), 1–10.
Vargo, S.L., Lusch, R.F., 2016. Institutions and axioms: an extension and update of service-dominant logic. J. Acad. Mark. Sci. 44 (1), 5–23.
Vargo, S.L., Maglio, P.P., Akaka, M.A., 2008. On value and value co-creation: a service systems and service logic perspective. Eur. Manag. J. 26 (3), 145–152.
Vendrell-Herrero, F., Bustinza, O.F., Parry, G., Georgantzis, N., 2016. Servitization, digitization and supply chain interdependency. Ind. Mark. Manag..
Verstrepen, S., van Den Berg, R., 1999. Servitization in the automotive sector: creating value and competitive advantage through service after sales. Global Production Management, KluwerPublishers, London.
Visnjic I., Van Looy B., 2013. Can a product manufacturer become a successful service provider? In pursuit of a business model that fosters complementarity between product and service activities perspectives. Academy of Management Conference. San Antonio. USA.
Wilkinson, W., Dainty, A., Neely, A., 2009. Changing times and changing timescales: the servitization of manufacturing. Int. J. Oper. Prod. Manag. 29, 5.
Windahl, C., Andersson, P., Berggren, C., Nehler, C., 2004. Manufacturing firms and integrated solutions: characteristics and implications. Eur. J. Innov. Manag. 7 (3), 218–228.
Yoo, Y., Henfridsson, O., Lyytinen, K., 2010. Research commentary —the new organizing logic of digital innovation: an agenda for information systems research. Inf. Syst. Res. 21 (4), 724–735.
Zaki, M., Neely, A., 2014. Optimising asset management within complex service networks: the role of data. Cambridge Service Alliance Working Paper, pp. 1–11.